



COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
PERMIT
TO WITHDRAW GROUNDWATER
(FOR USE IN GROUNDWATER MANAGEMENT AREAS)

Permit Number: GW0043501
Effective Date: September 1, 2013
Modified Date: October 29, 2014
Expiration Date: August 31, 2023

Pursuant to Section 62.1-256 of the Ground Water Management Act of 1992 (Chapter 25, Title 62.1 of the Code of Virginia) and the Ground Water Withdrawal Regulation (9 VAC 25-610-10 *et seq.*), the STATE WATER CONTROL BOARD hereby authorizes

Permittee Boykins Holdings, LLC
Address 150 N. Park Street
Asheboro, North Carolina 27203
Facility AEC Virginia

to withdraw and use groundwater in accordance with this permit and the application received March 4, 2010 and subsequently amended.

The permittee is authorized to withdraw 52,250,000 gallons per year.

The permittee shall comply with all requirements contained on this cover page, Part I - Permit Standards, Limitations, and Conditions, Part II - Special Conditions, the Ground Water Management Act of 1992 (Chapter 25, Title 62.1 of the Code of Virginia), and the Ground Water Withdrawal Regulation (9 VAC 25-610-10 *et seq.*). Nothing in this permit or this regulation shall be construed to relieve the permittee of the duty to comply with all applicable Federal and State statutes and regulations.

The permitted withdrawal will be used for industrial purposes to provide water for the dyeing and finishing of webbing. Other beneficial uses are not authorized by this permit.

Any noncompliance with permit conditions, the Ground Water Withdrawal Regulation (9 VAC 25-610-10 *et seq.*) or the Ground Water Management Act of 1992 (Chapter 25, Title 62.1 of the Code of Virginia) is a violation of the regulation and law, and is grounds for enforcement action, permit termination, revocation, amendment, or denial of a permit renewal application.

By direction of the STATE WATER CONTROL BOARD, this Permit is granted by:

Signed 
For the STATE WATER CONTROL BOARD

Date 10/17/14

Part I
Permit Standards, Limitations and Conditions

1. The withdrawal of groundwater shall originate from the following withdrawal points:

<u>Owner Well Name</u>	<u>DEQ Well #</u>	<u>Depth</u>	<u>Aquifer</u>	<u>Latitude</u>	<u>Longitude</u>
New Well #1	187-00211	289'	Middle Potomac	<u>36° 35' 12.7"</u>	<u>77° 12' 16.0"</u>
New Well #2	187-00256	289'	Middle Potomac	<u>36° 35' 11.7"</u>	<u>77° 12' 15.8"</u>

2. Withdrawals from the well system are limited as follows:

In a calendar month: Total pumpage from these wells shall not exceed 5,500,000 gallons. The permittee shall report any amount in excess of the monthly withdrawal limit by the fifth day of the month following the month of over withdrawal.

3. Water use from each well and total system water use shall be recorded monthly and reported on forms provided by the Department of Environmental Quality (Department) to the Groundwater Withdrawal Permitting Program by the tenth day of each January, April, July and October for the respective previous standard quarter. Records of water use shall be maintained by the permittee as required in Section 9 VAC 25-610-130(F).
4. Permitted users shall install in-line totalizing flow meters to read gallons, cubic feet or cubic meters on each well prior to beginning the permitted use. Meters shall be tested in accordance with American Water Works Association (AWWA) Manual M-6, "Water Meters - Selection, Installation, Testing, and Maintenance". Such meters shall produce volume determinations within plus or minus 10% of actual flows. A defective meter or other device must be repaired or replaced within 30 days. A defective meter is not grounds for not reporting withdrawals. During any period when a meter is defective generally accepted engineering methods shall be used to estimate withdrawals and the period during which the meter was defective must be clearly identified in groundwater withdrawal reports.
5. Each permitted well shall be equipped in a manner such that water levels can be measured during pumping and non-pumping periods without dismantling any equipment. Any opening for tape measurement of water levels shall have an inside diameter of 0.5 inches and be sealed by a removable plug or cap. The permittee shall provide a tap for taking raw water samples from each permitted well.
6. The permittee shall not place a pump or water intake device lower than the top of the uppermost confined aquifer that a well utilizes as a groundwater source or lower than the bottom of an unconfined aquifer that a well utilizes as a groundwater source.
7. Each well that is included in this groundwater withdrawal permit shall have affixed to the well casing, in a prominent place, a permanent well identification plate that records the Department well identification number, the groundwater withdrawal permit number, the total depth of the well and the screened intervals in the well, at a minimum. Such well identification plates shall be in a format specified by the Department and are available from the Department.

8. The Water Conservation and Management Plan (Plan) as described in the application received March 4, 2010 is incorporated into this permit and included as Attachment A. Requirements in the Plan shall have the same effect as any condition contained in this permit and may be enforced as such. Records of activities conducted pursuant to the Plan are to be submitted to the Department upon request.
9. This permit may be reopened for the purpose of amending the conditions of the permit to meet new regulatory standards duly adopted by the State Water Control Board (Board).
10. A new permit application must be submitted 270 days before the expiration date of this permit.
11. A new permit application must be submitted 270 days prior to any proposed modification to this permit that will result in an increase of withdrawal above permitted limits or violate the terms and conditions of this permit.
12. This permit may be reopened for amendment, transfer, or revocation as described in Part VI of the Ground Water Withdrawal Regulations (9 VAC 25-610-290 through 9 VAC 25-610-340).
13. The permittee must notify the Department in writing and obtain staff approval of any change in the status, construction or pump setting of wells included in this permit. A revised GW-2 form must be submitted to the Department within 30 days in the event that the physical construction of a well is altered or the pump setting in the well is changed.
14. The permittee must notify the Department in writing of any change of contact person, address, or phone number that is contained in the application received March 4, 2010.
15. Upon presentation of credentials the Board or Department, or any duly authorized agent, shall have the power to enter, at reasonable times and under reasonable circumstances, any establishment or upon any property, public or private, located anywhere in the Commonwealth for the purposes of obtaining information, conducting surveys or inspections, or inspecting wells and springs to ensure compliance with any permits, standards, policies, rules, regulations, rulings and special orders which the Board or Department may adopt, issue or establish to carry out the provisions of the Ground Water Management Act of 1992 and the Ground Water Withdrawal Regulations.

Part II
Special Conditions

1. **Mitigation Plan**

The Mitigation Plan, as described in the application received March 4, 2010 and subsequently amended, is incorporated into this permit and included as Attachment B. Requirements in the Mitigation Plan and subsequent revisions shall have the same effect as any condition contained in this permit and may be enforced as such.

2. **Additional Wells**

A minor amendment to this permit must be made to include additional wells. Additional wells may be permitted under a minor amendment if the total withdrawal does not exceed the permitted amount contained in this permit, the withdrawal from all additional wells originates from the Middle Potomac Aquifer, and the location of the wells are approved by Department staff prior to construction. Additionally, a complete suite of geophysical logs (Spontaneous Potential, Single Point Resistance, 16/64 Short and Long Normal, Natural Gamma) shall be submitted to the Groundwater Withdrawal Permitting Program prior to setting the pump intake.

3. **Pump Intake Settings**

Pump settings in individual wells are limited as follows:

<u>Owner Well Name (or #)</u>	<u>DEQ Well #</u>	<u>Max Pump Setting</u> (ft below land surface)
New Well #1	187-00211	190
New Well #2	187-00256	190

The permittee may provide additional information regarding the depth of the top of the Middle Potomac Aquifer to justify pump settings different from those listed above. Any change in the pump settings must receive prior approval by staff of the Department and be included in this permit as a minor amendment.

4. **Permit Reopener**

This permit may be reopened if the issuance of groundwater withdrawal permits required by the Ground Water Management Act of 1992 for existing permitted or certificated users indicates that the basis used for predicting compliance with regulatory drawdown criteria was inaccurate.

ATTACHMENT A

WATER CONSERVATION AND MANAGEMENT PLAN

Water Conservation and Management Plan

**Boykins Holdings, LLC
Boykins, Southampton County, Virginia**

October 10, 2014

For Submittal:

**Commonwealth of Virginia
Department of Environmental Quality
Tidewater Regional Office
Ground Water Permits
5636 Southern Boulevard
Virginia Beach, Virginia 23462**

Prepared by:

**Boykins Holdings, LLC
32056 East Circle
Boykins, Virginia 23827**

**Water Conservation and Management Plan
Boykins Holdings, LLC
Boykins, Southampton County, Virginia
October 10, 2014**

1. Introduction

1.1 Background

Boykins Holdings, LLC is the owner of a textile manufacturing facility called AEC Virginia (AEC) that produces webbing for commercial and military use. The facility has been in operations since 1962 and has always used ground water for its process water. In the process of making webbing, the fabric is dyed to the purchaser's specifications. AEC operates eight dye machines that use approximately 85 percent of the ground water pumped. Additionally, potable water is purchased from the Boykins/Branchville Water System for water fountains and rest rooms.

1.2 Purpose of Plan

The Water Conservation and Management Plan presents an ongoing, life time program designed to conserve and reduce water use through optimization of manufacturing in plant operations and education of plant employees to promote efficient water use. Water conservation includes measures and actions that reduce the demand for water, improve the efficiency of water use and reduce water losses and wastes. Conservation can reduce future water supply needs and may enable postponement of costly capital improvements to the water supply system.

1.3 Applicable Regulations

Pursuant to the Groundwater Act of 1973, the General Assembly determined that unrestricted usage of ground water was and will continue to contribute to pollution and shortage of ground water, thereby jeopardizing the public welfare, safety, and health. The Virginia Ground Water Management Act of 1992 mandates the regulation of large ground water withdrawals in certain portions of the Commonwealth to prevent adverse impacts on the ground water supply due to over-utilization. Southampton County is within the declared Eastern Virginia Groundwater Management Area (GWMA) (9VAC-25-600-20 et seq.). All of the County's water supply is currently obtained from ground water supplies.

The Virginia Administrative Code provides the Virginia Department of Environmental Quality (VDEQ) authority to require a water conservation and management plan as part of the reapplication process for ground water withdrawal permits in the Commonwealth (9VAC25-610-100).

The plan must include:

- Requirements for the use of water-saving plumbing and processes including, where appropriate, the use of water-saving fixtures in new and renovated plumbing as provided in the Uniform Statewide Building Code;
- A water loss reduction program;
- A water use education program;

- An evaluation of potential water reuse options; and
- Requirements for mandatory water use reductions during water shortage emergencies declared by the local governing body or director including, where appropriate, ordinances prohibiting the waste of water generally and requirements providing for mandatory water use restrictions, with penalties, during water shortage emergencies.

2 Water Loss Reduction

2.1 Water Conserving Plumbing Code

Plumbing work in Southampton County must conform to the 1997 edition of the Virginia Uniform Statewide Building Code (VUSBC) for requirements for water conserving fixtures. The code applies to all new construction and major renovation of existing structures and is enforced by the County Building Inspector's Office. AEC will use water conserving fixtures in building expansions and major renovations and elsewhere when practicable. Such fixtures include devices to reduce hand washing water usage and devices to limit toilet flush water volumes.

Another benefit of low flow plumbing fixtures beside the reduction in the unnecessary use of potable water is the reduction of the volume of wastewater requiring treatment.

2.2 Water Audit

AEC will perform annual audits at a minimum throughout the manufacturing processes to quantify amounts of water used throughout the system and to identify where better water management practices can reduce consumption quantities. The audit will look for:

- water leaks from pipes and joints;
- leaking valves and valves not turned off;
- overfilling of mixing and wash tanks; and
- operating procedures that waste water.

AEC began a water audit process in 2003 and continues today to identify areas where water could be saved. Measures that have been implemented since 2003 include:

- Installation of electric solenoid valves on all dye ranges to automatically shut off water to dye machines that are idle for more than 5 minutes. This has eliminated the constant discharge of water from idle dye machines into the waste treatment system.
- Bypass valves are locked to prevent any unauthorized use of water.

- Fresh water is metered on dye machine cooling rolls and is then automatically discharged into wash tanks to begin a counter-flow operation. The water is reused as the wash water flows counter to the direction of product flow. Clean water input is focused on the final wash box (cleanest), then moves to the next dirtiest wash tank, and the next, and then the wash water is finally discharged from the first wash box (dirtiest). This wash water flows from box to box in the opposite direction to the flow of the webbing replaced the old practice of using fresh water in each box.
- Discharge water from the first wash box is reused once more to create a water seal at the steamer.
- Vacuum pump, water-seal water on all dye machines is reused back into the wash tank counter flow process.
- Water restrictors were placed on all the dye machine vacuum pumps to limit the amount of water flow to the seals per the minimum flow recommended by the manufacturer.
- Fresh water chill spray on calender rolls is timed to operate only 10 seconds every 2 minutes as opposed to continuous spray.
- Fresh water is metered to chill tanks where the webbing is cooled as it exits the ovens.
- Dye machine specification sheets were reviewed and incorporated in the standard operating procedures (SOPs) to guarantee machines are set properly and not wasting water.
- Week-end shutdown check sheets were developed and provided for each department so an orderly shutdown of machines will occur and insure that water does not run unattended over a week-end.

AEC will continue to audit the use of water throughout the plant looking for areas that water conservation measures can be implemented.

3 Water Use Education

An annual employee awareness and education program will be established. Without employee education on water conservation goals and measures, the Water Conservation and Management Plan could be met with opposition from employees. Employee acceptance is essential to a successful water conservation program.

The employee training will incorporate the following items:

- Review of the limited ground water resource for the plant's water supply and the demand of other plants and municipalities for the water.

- The cost of wasting water;
 - Cost to pump water from wells
 - Cost to purchase water from the public utility
 - Cost to pre-treat water at the plant wastewater facility
 - Cost to discharge water to public utility from the wastewater treatment plant
 - Cost to discharge water to the public utility from domestic sources
- Recognizing and reporting leaks and poor water use.

4 *Water Reuse*

AEC will monitor the different uses of water in the manufacturing process to see where water reuse can reduce the demand on pumped ground water. AEC will look at areas where reused water from one process can be used again in another process as in the counter-current water flow in the dye machine wash boxes as described in Section 2.2.

5 Drought Response and Contingency Plan

5.1 *Purpose*

Drought use restrictions are conservation measures that are employed to produce short-term water demand reductions during water supply emergencies. They are instituted to create immediate reductions in water usage and carry either a long-term or short-term cost to AEC in reduced production volumes. When restrictions are removed, habits formed tend to linger for a time and to some extent can have a lasting impact on water use.

Drought use restrictions are considered a form of conservation because they result in demand reductions; however, they are addressed separately from normal conservation because they are only implemented during periods when the water supply is threatened. The savings associated with the implementation of drought use restrictions should not be incorporated into the planning of future water supplies. Rather, such restrictions are reserved as contingency measures for emergency situations and are more severe than those used to determine the long-term water supply deficit.

5.2 *Implementation of Drought Measures*

Emergency use restriction procedures will start when:

- A water emergency is declared by the Executive Director of the Department of Environmental Quality in accordance with the Groundwater Management Act; or,
- By mutual agreement between the Southampton County Board of Supervisors and Department of Public Utilities.

AEC's Drought Response and Contingency Plan will use the drought stages described in the Virginia *Drought Assessment and Response Plan*, March 28, 2003, as the trigger mechanism for AEC's plan (Attachment). These are listed below along the conservation measures that AEC will implement.

5.2.1 *Drought Watch*

When the Virginia Drought Coordinator sets a Drought Watch, AEC will review its existing drought water conservation and contingency plan. AEC personnel will do a walk through the water distribution system from wells to final pretreatment discharge looking for leaks and other water releases that need to be corrected.

5.2.2 *Drought Warning*

At this stage, AEC will initiate voluntary water conservation requirements contained in its' drought water conservation and contingency plan.

- Hold employee meetings by department to underscore urgency.
- The facility will review current production requirements on a *weekly* basis and if feasible reduce metered water at fresh water metered locations.
- The facility will review current production requirements on a *weekly* basis and will limit dye pan cleaning times to the minimum amount of flushing between dye pattern changes.
- Any irrigation activities not required to reduce storm water runoff will be reduced.
- The Plant will reduce any cleaning activities that will not affect product quality or quantity.

5.2.3 Drought Emergency

AEC will initiate mandatory water conservation requirements contained in its' drought water conservation and contingency plan that include the mandatory non-essential water use restrictions listed on page 16 of the *Virginia Drought Assessment and Response Plan*.

- Hold employee meetings by department to underscore urgency, stressing the importance of compliance.
- Involve employees with the conservation process and reward compliance where applicable.
- The facility will review current production requirements on a *daily* basis and if feasible reduce metered water at fresh water metered locations.
- The facility will review current production requirements on a *daily* basis and will limit dye pan cleaning times to the minimum amount of flushing between dye pattern changes.
- Any irrigation activities not required to reduce storm water runoff will be stopped.
- The Plant will postpone any cleaning activities that will not affect product quality or quantity.
- The Plant will contact customers to determine if any orders can be postponed to a later date without a financial burden/penalty on the facility and/or the customer, thus reducing the volume of water needed for production.

6 Program Monitoring and Evaluation

The water conservation and management plan is a living document requiring changes as necessary to keep it effective and economical. Observations concerning the water use in the manufacturing processes, growth projections, and achieved water savings will be tracked and used as needed to modify the plan.

The plan will be reviewed periodically to take advantage of new devices and measures to save water. As a condition of the Ground Water Withdrawal Permit, all plan modifications must be approved by VDEQ before incorporation.

Data needs to be collected to monitor the effectiveness of the water conservation and management plan and includes:

- AEC will keep good records of conservation plan impacts. Water use data before, during, and after implementation of a measure will be collected to evaluate water savings.
- Actual implementation costs and water savings will be compared to design costs and water savings. Costs and water savings will be reviewed annually.
- Customer acceptance levels for product will be monitored to determine if any water conservation measure affected the quality of the product. If customer feedback is negative, it is indicative of needed changes to a particular conservation measure. If the feedback is positive, it reinforces that the conservation measure(s) is succeeding.

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Virginia Drought Assessment and Response Plan

**Submitted by the Drought Response Technical Advisory
Committee**

March 28, 2003

Introduction

During the summer of 2002 Virginia experienced significant drought impacts due to precipitation deficits that dated to 1999 in most areas of the Commonwealth. While this drought did not reach the level of severity of the drought of record (1930-1932), increases in water demands when compared to the 1930's resulted in significant impacts to all sectors of Virginia's economy and society.

The intensity of these drought impacts peaked in late August 2002. Wildfire indices were at levels previously unrecorded in Virginia, the vast majority of Virginia agricultural counties had applied for Federal drought disaster designation, streamflows reached period of record lows, and thousands of individual private wells failed. During the third week of August several public water supply systems across the Commonwealth were on the brink of failure. Several large municipal systems, such as Charlottesville and Portsmouth, had less than sixty days of water supply capacity remaining in reservoirs. Several smaller rural systems that rely primarily on withdrawals from free-flowing streams, such as the towns of Farmville and Orange, had at most a few days of water supply available and were forced to severely curtail usage.

On August 30, 2002 Governor Warner took the unprecedented action of declaring a drought emergency in the majority of the Commonwealth by issuance of Executive Order #33. This executive order required the elimination of some non-essential water uses in large areas of the Commonwealth. In addition, this executive order named the Deputy Secretary of Natural Resources as the Commonwealth Drought Coordinator and charged him with the implementation of the water use restrictions. While these emergency actions were necessary in light of the drought impacts within the Commonwealth, they resulted in significant confusion and consternation among water users who were impacted.

On December 13, 2002 Governor Warner issued Executive Order #39, the Virginia Water Supply Initiative. This executive order requires the Commonwealth's Drought Coordinator to develop a formal drought assessment and response plan. In January 2003, the Deputy Secretary of Natural Resources invited a broad coalition of stakeholders to participate in a Drought Response Technical Advisory Committee chaired by the Virginia Department of Environmental Quality. This technical advisory committee was supported by the existing Virginia Drought Monitoring Task Force. Groups and agencies invited to participate or represented on the Drought Monitoring Task Force are listed below.

Mid-Atlantic Car Wash Association
National Spa and Pool Institute
Virginia Rural Water Association
Virginia Agribusiness Council
Virginia Green Industry Council
Virginia Golf Course Superintendent's Association
Virginia Association of Counties
Virginia Section of the American Water Works Association
Virginia Municipal League
Virginia Sports Turf Manager's Association
Virginia Hospitality and Travel Association
Virginia Water Well Association

Virginia Manufacturer's Association
Virginia Farm Bureau
Southern Environmental Law Center
Roanoke River Landowner's Association
Virginia Irrigation Association
City of Portsmouth
Henrico County
Town of Orange
U.S. Navy
U.S. Army Corp of Engineers
Virginia Department of Environmental Quality
Virginia Department of Emergency Management
Virginia Department of Health
Virginia Cooperative Extension Service
Virginia Department of Game and Inland Fisheries
Virginia Department of Agriculture and Consumer Services
Virginia State Climatology Office
Virginia Department of Forestry
U.S. Geological Survey
U.S. Department of Agriculture, Farm Services Agency
National Oceanic and Atmospheric Administration, National Weather Service

The Drought Response Technical Advisory Group met three times in February and March and developed the following drought assessment and response plan for the consideration of the Commonwealth Drought Coordinator. There are several key concepts that must be kept in mind as this proposal is reviewed.

The development of droughts and the development of associated impacts is very complex. The coverage of monitoring points for most drought indicators (precipitation deficits, streamflows, ground water levels, and reservoir storage) is sparse. These two facts work together to preclude the development of a truly automated, objective drought monitoring system. This proposal includes a monitoring framework that relies heavily on the professional judgment of the Virginia Drought Monitoring Task Force in the determination of drought stages in the Commonwealth.

Due to the complexity of drought impacts on differing segments of society, the responses that are proposed at each drought stage are actions that should be considered. The Commonwealth Drought Coordinator will need to evaluate reported drought conditions and the impacts associated with those conditions and decide what actions are necessary. As an example, there will likely be circumstances in the future when actions currently proposed at the drought warning stage should be initiated somewhat earlier.

From a water supply standpoint, the impacts on a particular water supply may be as dependent on the reliability of that supply as it is on the severity of drought conditions at any point in time. As an example, water supply systems that rely on small order free-flowing streams and do not have storage may experience large impacts from relatively small drought events. This variability in reliability exists in all categories of water supplies; public waterworks, large self-supplied industrial and commercial supplies, and individual residential water supplies. Nothing that is proposed in this plan should be

viewed as limiting local government or public waterworks from taking more stringent action at any time to respond to local conditions.

Drought Monitoring

The responsibility for monitoring drought conditions in the Commonwealth rests with the Virginia Drought Monitoring Task Force (DMTF), an interagency group of technical representatives from state and federal agencies responsible for monitoring natural resource conditions and the effects of drought on various segments of society. During periods of normal moisture conditions, the Virginia Department of Environmental Quality will monitor the NOAA U.S. Drought Monitor, and will produce information from this report specific to Virginia on a monthly basis. The Virginia drought map will be produced concurrent with the release of NOAA monthly and seasonal outlooks, which usually are released on the Thursday closest to the middle of the month. The DMTF will be activated with the first occurrence of *moderate drought* conditions (D1) in the Commonwealth or the occurrence of smaller scale moisture deficits that may fall beneath the level of resolution of the U.S. Drought Monitor. The DMTF will monitor the advance of drought conditions in the Commonwealth using the drought indicators listed on page 4 as other indicators such as the Standardized Precipitation Index, Palmer Drought Severity Index, Crop Moisture Index, Keetch-Byrum Drought Index, and NOAA monthly and seasonal precipitation outlooks. In addition, the DMTF will monitor the effect of advancing drought conditions on various sectors of society including agriculture, forestry, and recreation. The DMTF will produce a monthly report of current drought conditions and their effects, and will generally remain active until the NOAA U.S. Drought Monitor indicates that all drought impacts in the Commonwealth have subsided to an *unusually dry* level (D0). The DMTF may remain active after all drought impacts have subsided to an *unusually dry* level when small areas beneath the resolution of the U.S. Drought Monitor continue to experience drought impacts. The primary purpose of the drought monitoring system described below is to provide a framework for the DMTF to operate within when preparing recommendations for the declaration of various drought stages. Due to the complex nature of drought development, professional expertise must be applied to the wide range of drought monitoring data in order to develop defensible recommendations.

Drought Evaluation Regions

For the purpose of implementation of this drought response plan the Commonwealth has been divided into thirteen drought evaluation regions. The regions were established based on a consideration of river basins, climatic divisions, physiographic provinces, major geomorphologic features, and service areas of major water supplies. Regional boundaries were chosen to correspond with local government boundaries to simplify the implementation of this plan. While the regional boundaries are somewhat arbitrary, they generally correspond to regions of the Commonwealth that possess similar climatic, ground water, streamflow and water supply conditions. Drought evaluation regions for the Commonwealth are listed below and displayed in Appendix A. Towns and independent cities are only listed when they are on the boundary of a drought evaluation region. Drought evaluation regions included all towns and independent cities located within the region.

Big Sandy Drought Evaluation Region: Lee, Wise, Buchanan, Dickenson, Scott, Russell, Tazewell, Washington and Smyth Counties.

New River Drought Evaluation Region: Grayson, Wythe, Bland, Carroll, Floyd, Pulaski, Giles, and Montgomery Counties.

Roanoke River Drought Evaluation Region: Patrick, Franklin, Roanoke, Henry, Bedford, Pittsylvania, Campbell, Halifax, Charlotte, and Mecklenburg Counties.

Upper James Drought Evaluation Region: Craig, Alleghany, Bath, Highland, Botetourt, and Rockbridge Counties.

Middle James Drought Evaluation Region: Amherst, Lynchburg, Nelson, Albemarle, Appomattox, Buckingham, Fluvanna, Prince Edward, Cumberland, Goochland, Amelia, Powhatan, Chesterfield, Petersburg, Hopewell, Colonial Heights, Henrico, and Hanover Counties.

Shenandoah Drought Evaluation Region: Augusta, Rockingham, Shenandoah, Frederick, Page, Warren, and Clarke Counties.

Northern Virginia Drought Evaluation Region: Fauquier, Loudoun, Prince William, Arlington, and Fairfax Counties.

Northern Piedmont Drought Evaluation Region: Greene, Madison, Rappahannock, Orange, Culpeper, Louisa, Spotsylvania, and Stafford Counties.

Chowan Drought Evaluation Region: Lunenburg, Nottoway, Brunswick, Dinwiddie, Greenville, Sussex, Prince George, Southampton and Surry Counties.

Northern Coastal Plain Drought Evaluation Region: Caroline, King George, King William, King and Queen, Essex, Richmond, Westmoreland, Gloucester, Mathews, Middlesex, Lancaster, and Northumberland Counties.

York-James Drought Evaluation Region: Hampton, Newport News, James City, York, Charles City, and New Kent Counties.

Southeast Virginia Drought Evaluation Region: Suffolk, Isle of Wight, Chesapeake, Virginia Beach, Portsmouth, and Norfolk.

Eastern Shore Drought Evaluation Region: Northampton and Accomack Counties.

Drought Indicators

In order to monitor potential drought conditions in a uniform manner across the Commonwealth, Virginia will use four indicators to evaluate drought severity. The indicators are based on the amount of precipitation and the effect of the precipitation (or lack of precipitation) on the hydrologic system. These indicators include:

- Precipitation Deficits
- Streamflows
- Ground water levels
- Reservoir storage

Indicators will be evaluated by comparing current conditions to long term average conditions. This evaluation will be used to determine if current conditions are within a range of conditions commonly experienced or if significant drought conditions exist.

Precipitation Deficits

Precipitation deficits will be monitored by comparing current precipitation amounts with historical precipitation values as a percent of normal long-term average values. Comparisons will be made for each drought evaluation region using data compiled by the Office of the State Climatologist. Normal long-term average precipitation is defined as the mean precipitation for a thirty-year period of record for the area and time period being evaluated.

Precipitation amounts will be evaluated based on the water year (beginning October 1). Water years are a natural dividing point for water supply drought, as precipitation that falls in the first six months of a water year is analogous to putting money in the bank. Precipitation that occurs during this six month period has the potential to recharge ground water, which will sustain stream flows and support withdrawals from wells during the following six month period when moisture deficits naturally develop as evaporation and plant transpiration generally exceed precipitation. If a precipitation deficit outside of the normal range exists at the end of a water year, the precipitation records will carry forward until a normal condition is reached (i.e. if a precipitation deficit exists on October 1, precipitation records for the previous twelve months will be evaluated until the twelve month deficit is eliminated).

Because the significance of a precipitation deficit changes as the water year progresses, drought response stages will trigger at different percentages of normal depending upon the date of evaluation.

Months Analyzed	Normal (% of Normal Precipitation)	Watch (% of Normal Precipitation)	Warning (% of Normal Precipitation)	Emergency (% of Normal Precipitation)
October-December	>75.0	<75.0	<65.0	<55.0
October-January	>80.0	<80.0	<70.0	<60.0
October-February	>80.0	<80.0	<70.0	<60.0
October-March	>80.0	<80.0	<70.0	<60.0
October-April	>81.5	<81.5	<71.5	<61.5
October-May	>82.5	<82.5	<72.5	<62.5
October-June	>83.5	<83.5	<73.5	<63.5
October-July	>85.0	<85.0	<75.0	<65.0
October-August	>85.0	<85.0	<75.0	<65.0
October – September (and previous 12 months)	>85.0	<85.0	<75.0	<65.0

Streamflow

Streamflow gages representing drought evaluation regions will be used to monitor streamflow responses to drought conditions. Representative daily flow values will be compared with historic flow statistics for the period of record. Representative daily streamflows above the 25th percentile for return flow frequency will be defined as normal conditions. Representative daily streamflows between the 10th and 25th percentile for return flow frequencies will be defined as drought watch conditions. Representative daily streamflows between the 5th and 10th percentile for return flow frequencies will be defined as drought warning conditions. Representative daily streamflows below the 5th percentile for return flow frequencies will be defined as drought emergency conditions. (A streamflow that represents the 25th percentile of return flow frequencies indicates that, for the period of record, 75% of streamflows have exceeded the current flow.) Gages were selected on the basis of the availability of real-time data, period of record, and relative location within the drought evaluation region. Typically, gages were selected that monitor moderately large drainage areas on streams without significant regulation. In drought evaluation areas where no appropriate stream gages exist, this indicator will not be utilized. Gages selected to monitor drought severity in each evaluation region are listed below and displayed in Appendix B.

Big Sandy Drought Evaluation Region: Clinch River at Cleveland, USGS Station 03524000

New River Drought Evaluation Region: Reed Creek at Graham Forge, USGS Station 03167000

Roanoke River Drought Evaluation Region: Goose Creek near Huddleston, USGS Station 02059500

Upper James Drought Evaluation Region: Cowpasture River near Clifton Forge, USGS Station 02016000

Middle James Drought Evaluation Region: Appomattox River at Farmville, USGS Station 02039500

Shenandoah Drought Evaluation Region: North Fork Shenandoah near Strasburg, USGS Station 01634000

Northern Virginia Drought Evaluation Region: Accotink Creek near Annandale, USGS Station 01654000

Northern Piedmont Drought Evaluation Region: Rapidan River near Culpeper, USGS Station 01667500

Chowan Drought Evaluation Region: Meherrin River near Lawrenceville, USGS Station 02051500

Northern Coastal Plain Drought Evaluation Region: Mattaponi River near Beulahville, USGS Station 01674500

York-James Drought Evaluation Region: Chickahominy River near Providence Forge, USGS Station 02042500

Southeast Virginia Drought Evaluation Region: No stream gages available to monitor.

Eastern Shore Drought Evaluation Region: No stream gages available to monitor.

Ground Water Levels

Water table ground water monitoring wells representing drought evaluation regions will be used to monitor shallow ground water responses to drought conditions. In areas west of Route 95 it was assumed that wells completed in shallow fractured rock formations are indicative of water table conditions. Measured ground water levels will be compared with historic level statistics for the period of record. Measured ground water levels above the 25th percentile for all historic levels will be defined as normal conditions. Measured ground water levels between the 10th and 25th percentiles for all historic levels will be defined as drought watch conditions. Measured ground water levels between the 5th and 10th percentile for all historic levels will be defined as drought warning conditions. Measured ground water levels below the 5th percentile for all historic levels will be defined as drought emergency conditions. Monitoring wells were selected on the basis of period of record and relative location within the drought evaluation region. Monitoring wells selected to monitor drought severity in each evaluation region are listed below and displayed in Appendix C. In drought evaluation regions where no appropriate monitoring wells exist, the ground water indicator will not be used.

Big Sandy Drought Evaluation Region: No water table monitoring wells available to monitor.

New River Drought Evaluation Region: Christiansburg Observation Well, USGS Local Number 27F 2 SOW 019

Roanoke River Drought Evaluation Region: Roanoke-Nelson Observation Well, USGS Local Number 31G 1 SOW 008

Upper James Drought Evaluation Region: Glasgow Observation Well, USGS local Number 35K 1 SOW 063

Middle James Drought Evaluation Region: Buckingham Observation Well, USGS Local Number 41H 3; Virginia Maples Observation Well, USGS Local Number 53K 19 SOW 080

Shenandoah Drought Evaluation Region: McGaheysville Observation Well, USGS Local Number 41Q 1; Blandy Farm Observation Well, USGS Local Number 46W 175

Northern Virginia Drought Evaluation Region: Harper's Ferry Observation Well, USGS Local Number 49Y 1 SOW 022; Arlington Cemetery Observation Well, USGS Local Number 54V 3

Northern Piedmont Drought Evaluation Region: Gordonsville Observation Well, USGS Local Number 45P 1 SOW 030

Chowan Drought Evaluation Region: Slade Farm Observation Well, USGS Local Number 57E 13 SOW 094C

Northern Coastal Plain Drought Evaluation Region: George Washington Birthplace Observation Well, USGS Local Number 55P 9

York-James Drought Evaluation Region: Toano Observation Well, USGS Local Number 56H 31 SOW 135B

Southeast Virginia Drought Evaluation Region: Brinkley Observation Well, USGS Local Number 58B 13; Pungo Observation Well, USGS Local Number 62B 1 SOW 098A

Eastern Shore Drought Evaluation Region: P. C. Kellam Observation Well, USGS Local Number 63H 6 SOW 103A; Withams Observation Well, USGS Local Number 66M 19 SOW 110S

Reservoir Storage

Storage in major reservoirs will be used as a fourth drought indicator. Major reservoirs in Virginia support a wide variety of uses that include water supply storage, electric power generation, and flow augmentation to protect water quality. Water supply reservoirs will be evaluated based on the estimated days of available usable storage. Storage of greater than 120 days will represent normal conditions, storage of 90 to 120 days will represent watch conditions, storage of 60 to 90 days will represent warning conditions, and storage of less than 60 days will represent emergency conditions. Useable storage will be calculated as that storage above the level where advanced water treatment will be required.

Several large multi-purpose reservoirs will be evaluated as drought indicators. The criteria for consideration of drought stages are listed below for these reservoirs. Pool elevations of these reservoirs will be compared to benchmark elevations in relation to mean sea level (msl) or U.S. Army Corp of Engineers operating guide curves as indicated in the following table.

	NORMAL	DROUGHT WATCH	DROUGHT WARNING	DROUGHT EMERGENCY
Smith Mountain Lake	>793 feet msl	793 to 791.5 feet msl	791.5 to 790 feet msl	< 790 feet msl
Lake Moomaw	>1565 feet msl	1565 to 1562.5 feet msl	1562.5 to 1560 feet msl	< 1560 feet msl
Lake Anna	> 248 feet msl	248 to 246 feet msl	246 to 244 feet msl	< 244 feet msl
Kerr Reservoir	< 3 feet below the guide curve	3 to 6 feet below the guide curve	> 6 feet below the guide curve	< 288 feet msl

Reservoirs that will be used to monitor drought conditions are listed below. In drought evaluation regions where no appropriate reservoirs exist, this indicator will not be used.

Big Sandy Drought Evaluation Region: Big Cherry Water Supply Reservoir

New River Drought Evaluation Region: No reservoirs will be monitored.

Roanoke River Drought Evaluation Region: Smith Mountain Lake, Kerr Reservoir

Upper James Drought Evaluation Region: Lake Moomaw

Middle James Drought Evaluation Region: Lake Moomaw, Charlottesville Water Supply Reservoir System

Shenandoah Drought Evaluation Region: Switzer Water Supply Reservoir

Northern Virginia Drought Evaluation Region: Occoquan Water Supply Reservoir, Lake Manassas Water Supply Reservoir

Northern Piedmont Drought Evaluation Region: Lake Anna, Spotsylvania Water Supply Reservoir System

Chowan Drought Evaluation Region: Emporia Water Supply Reservoir

Northern Coastal Plain Drought Evaluation Region: Gloucester Water Supply Reservoir

York-James Drought Evaluation Region: Newport News Water Supply Reservoir System

Southeastern Virginia Drought Evaluation Region: Kerr Reservoir, Portsmouth Water Supply Reservoir System

Eastern Shore Drought Evaluation Region: No reservoirs will be monitored.

Other Indicators

The DMTF will evaluate all other available drought information during deliberations related to the development of drought stage recommendations. Other drought indicators that will be considered include the Standardized Precipitation Index, Palmer Drought Severity Index, Crop Moisture Index, and NOAA monthly and seasonal precipitation outlooks.

When streamflows or ground water levels at the selected monitoring sites previously listed indicate drought conditions, the DMTF will monitor other stream gages and ground water monitoring wells that are available.

The DMTF will evaluate the Cumulative Severity Index developed by the Virginia Department of Forestry (VDOF) and the Keech-Byrum Drought Index to determine the potential impact of drought on forests and the potential for wildfire starts. In addition, the DMTF will consider the number of wildfire starts and the number of acres of forest burned as supplied by the VDOF as indicators of drought impacts on forestry. The DMTF will evaluate information compiled by the Virginia Agricultural Statistics Service to assess the impacts of drought on agricultural interests in the state. The DMTF will also rely on the input of local agricultural extension agents through the Virginia Cooperative Extension Service to document actual drought impacts through the Commonwealth. In addition, the DMTF will evaluate the number of requests for federal

drought disaster designation as reported by the Virginia Department of Agriculture and Consumer Services.

The DMTF will consider operating conditions at public waterworks in the determination of drought recommendations. The Virginia Department of Health (VDH) monitors the conditions of many public waterworks in the Commonwealth on a monthly basis. At a minimum, individual public waterworks typically contact the VDH when they experience water supply problems that are due to drought. VDH will continue to provide support to these waterworks and will continue monthly reporting of water supply problems. These monthly reports will be used as an additional indicator of drought severity in the Commonwealth. In addition, the DMTF will consider the number of private well replacement permits issued by the VDH as an indication of drought impacts to persons served by this type of system.

Declaration of Drought Stages

The DMTF will use the four drought indicators; precipitation deficits, streamflows, ground water levels, and reservoir levels; as the initial indicators to be considered when making a recommendation concerning the declaration of a particular drought stage. When two indicators exceed the threshold for stage determination, the DMTF will evaluate all other drought information and provide a recommendation to the Virginia Drought Coordinator. This recommendation may be to declare a specific drought stage or the recommendation may include an explanation of why the particular drought stage should not be declared at that time. Conversely, the DMTF may recommend the declaration of a particular drought stage prior to the exceedance of threshold levels for two of the four indicators. Recommendations for declaration of specific drought stages will generally be based on the drought evaluation regions previously described. It is likely that conditions may exist where the DMTF may recommend the declaration of a specific drought stage for a portion of a drought evaluation region. Recommendations for declaration of a portion of a drought evaluation region may be based on differing climatic conditions within the area or differences in the ability of specific waterworks to reliably provide water during drought conditions.

As an example, when two of the four drought indicators indicate drought warning conditions, the DMTF will evaluate all other drought information available and, if the majority of information warrants declaration, recommend the declaration of a drought warning in the drought evaluation region where these conditions exist. In all cases, the final decision regarding the declaration of a particular drought stage will be at the discretion of the Virginia Drought Coordinator. Any local government may declare local drought emergencies, adopt emergency ordinances to address those local emergencies and implement those ordinances prior to the declaration of a Drought Emergency by the Governor of Virginia.

The DMTF will use the following general descriptions of four drought stages when making recommendations to the Virginia Drought Coordinator concerning drought declarations in the Commonwealth. These descriptions should not be viewed as absolute requirements for drought designation, but as a mechanism to be used by the DMTF to reach consensus on the appropriate drought recommendations.

Normal Conditions

No more than one indicator outside of the normal range:

- Precipitation exceeds the percent of normal precipitation for the time period in precipitation table
- Streamflows are above the 25th percentile
- Ground water levels are above the 25th percentile for all historic levels
- Water Supply Reservoirs exceed 120 days of useable storage or appropriate criteria for non-water supply reservoirs

Drought Watch

At least 2 indicators meet the following conditions:

- Precipitation levels are at or below the percent of normal precipitation for the time period in precipitation table
- Streamflows fall between the 10th and 25th percentile
- Ground water levels fall between the 10th and 25th percentile for all historic levels
- Water Supply Reservoirs contain between 90 and 120 days of useable storage or appropriate criteria for non-water supply reservoirs

Drought Warning

At least 2 indicators meet the following conditions:

- Precipitation levels are at or below the percent of normal precipitation for the time period in precipitation table
- Streamflows fall between the 5th and 10th percentile
- Measured ground water levels fall between the 5th and 10th percentile for all historic levels
- Reservoirs contain between 60 and 90 days of useable storage or appropriate criteria for non-water supply reservoirs

Drought Emergency

At least 2 indicators meet the following conditions:

- Precipitation levels are at or below the percent of normal precipitation for the time period in precipitation table
- Streamflows are at or below the 5th percentile
- Measured ground water levels fall are at or below the 5th percentile for all historic levels
- Reservoirs contain 60 days or less of useable storage or appropriate criteria for non-water supply reservoirs

Responses to Drought in Virginia

The impacts of drought on society are broad reaching and complex. In addition, the nature of a particular drought event is dependent on the time of year, the long-term duration of precipitation deficits, the immediate impacts of short-term precipitation deficits within a period of general precipitation deficits, and many other interrelated factors. In short, every significant drought has a particular signature and the impacts of no two droughts will be identical. Due to the complex nature of droughts, responses to individual drought events must be tailored to the impacts that are being propagated. The specific response activities that are delineated below for the three drought stages should

be viewed as activities that will generally be initiated and not as required activities that are "written in stone".

Drought watch responses are generally responses that are intended to increase awareness, in the public and private sector, to climatic conditions that are likely to precede the occurrence of a significant drought event. During this drought stage the primary activities that are suggested are to prepare for the onset of a drought event. It is unlikely that significant water use reductions will occur at this stage although it is possible that the increased public awareness of water conservation activities may reduce water use up to 5%.

Drought warning responses are generally responses that are required when the onset of a significant drought event is imminent. Water conservation and contingency plans that have been prepared during a drought watch stage would begin to be implemented. From the perspective of the Commonwealth, water conservation activities at this stage would generally be voluntary. Voluntary water conservation activities generally result in reductions in water use of 5-10%.

Drought emergency responses are generally responses that are required during the height of a significant drought event. During these times, it is likely that some water supplies will not supply the amount of water needed by all users and non-essential uses of water should be eliminated. Mandatory water conservation requirements contained in water conservation and contingency plans should be initiated at this stage. Mandatory water conservation activities generally result in water use reductions of 10-15%.

While actions on the State level are important for the purpose of alerting localities and citizens of the advance of drought impacts, actions by local governments, individual water suppliers, and individual citizens are much more important and effective in actually addressing the impacts of drought. Water sources used by public waterworks and self-supplied water users vary considerably across the Commonwealth. Water conservation requirements for water users whose only source of water supply is a free-flowing stream with no significant storage will likely be different than requirements for a water user who relies entirely on a reservoir system for water supply. The development of a drought water conservation and contingency plan that takes into account the nature of a particular water source and the nature of the end use of water withdrawn is necessary to assure that proper water conservation activities are instituted at the proper times. In general, water supplies that rely on sources with significant storage (reservoir and ground water based systems) will realize greater benefits of water conservation activities initiated early in a drought cycle when compared to supplies that rely solely on free-flowing streams. It is likely that individual private well users, especially those who rely on shallow water table wells, will receive the largest benefit from their early individual initiation of water conservation activities.

The following responses will generally be made upon declaration of individual drought stages.

Drought Watch

- The Virginia Drought Coordinator will declare a statewide or regional Drought Watch and will issue a press release indicating the reasons for the declaration.
- The Virginia Drought Coordinator will notify all local governments within the drought watch area of drought watch status.

- The Virginia Drought Coordinator will report the drought watch declaration to the Governor's Cabinet and request the assistance of all state agencies in the implementation of the drought response plan.
- The VDH will inform all public waterworks within the drought watch area of drought watch status.
- The Virginia Cooperative Extension Service will cooperate with all state agencies owning or controlling impoundments and/or river access to identify sources that may be used by livestock producers for emergency livestock watering during declared drought emergencies. VCE will inform livestock producers of these opportunities and will provide contact information necessary to access these sources.
- The DMTF will continue to monitor statewide moisture conditions and provide monthly reports of drought conditions to the Virginia Drought Coordinator who will update the Governor's Cabinet.
- The DMTF will make monthly reports of drought conditions available to media outlets within the drought watch area.
- The Virginia Drought Coordinator will encourage all public waterworks and self-supplied water users who withdraw more than 10,000 gallons per day to develop or review existing drought water conservation and contingency plans.
- All DMTF agencies will include water conservation information on their websites and will distribute water conservation information as broadly as possible.
- All executive branch agencies and institutions will review existing drought water conservation and contingency plans or develop new plans with the goal of reducing water usage by 15% during declared drought emergencies.
- VDH will continue monitoring problems incurred by public waterworks on a monthly basis.
- VDH will encourage all public waterworks to aggressively pursue leak detection and repair programs.
- Local governments and public waterworks may impose water use restrictions consistent with local water supply conditions at any time.

Drought Warning

- The Virginia Drought Coordinator will declare a statewide or regional Drought Warning and will issue a press release indicating the reasons for the declaration.
- The Virginia Drought Coordinator will notify all local governments within the drought warning area of drought warning status.
- The Virginia Drought Coordinator will advise the Governor and his Cabinet regarding the necessity of authorizing the Departments of State Police, Transportation and Motor Vehicles to grant temporary overweight/overwidth/registration/license exemptions to carriers transporting essential emergency relief supplies into and through the Commonwealth in order to support disaster response and recovery.
- The VDH will inform all public waterworks within the drought warning area of drought warning status.
- The Virginia Department of Agriculture and Consumer Services will cooperate with the Virginia Association of Counties, the Virginia Municipal League, Virginia Cooperative Extension, the Virginia Farm Bureau Federation and the Virginia Agribusiness Council in notifying agricultural communities, agriculture

interest groups and local governments within the drought warning area of the potential for federal agricultural drought disaster designation. VDACS will also work with VACO, VML, VCE, VFBB and VAC in communicating the appropriate procedure for local governments to use in applying to the Governor for federal disaster designation.

- The DMTF will continue to monitor statewide moisture conditions and provide monthly reports of drought conditions to the Virginia Drought Coordinator. Significant changes in drought conditions will be reported biweekly.
- The Virginia Drought Coordinator will update the Governor's Cabinet concerning drought conditions on a biweekly basis.
- The Governor's Press Office will encourage media outlets within the drought warning area to publicize updates of drought conditions by developing biweekly press releases.
- All local governments will be encouraged to review existing local ordinances requiring mandatory non-essential water use restrictions or adopt such ordinances consistent with the mandatory non-essential water use restrictions listed below.
- All public waterworks and self-supplied water users who withdraw more than 10,000 gallons per day will initiate voluntary water conservation requirements contained in drought water conservation and contingency plans.
- All public waterworks and self-supplied water users who withdraw more than 10,000 gallons per day that have not developed drought water conservation and contingency plans will be encouraged to voluntarily reduce or eliminate non-essential uses of water including the elimination of non-essential flushing of water lines.
- All persons who utilize any source of water for outdoor irrigation will assure that the minimum amount of water is utilized in the most efficient manner practical.
- All self-supplied users who withdraw less than 10,000 gallons per day, including private well users, will be encouraged to voluntarily reduce or eliminate non-essential uses of water.
- All executive branch agencies and institutions will initiate the reduction or elimination of non-essential uses of water with the goal of reducing total water usage by 5-10%.
- VDH will continue monitoring problems incurred by public waterworks on a monthly basis.
- Local governments and public waterworks may impose water use restrictions consistent with local water supply conditions at any time.

Drought Emergency

- The Governor will declare a statewide or regional Drought Emergency by executive order and will issue a press release indicating the reasons for the declaration.
- The Virginia Drought Coordinator will notify all local governments within the drought emergency area of drought emergency status.
- The VDH will inform all public waterworks within the drought emergency area of drought emergency status.
- The DMTF will continue to monitor statewide moisture conditions and provide monthly reports of drought conditions to the Virginia Drought Coordinator. Significant changes in drought conditions will be reported weekly.

- The Virginia Drought Coordinator will update the Governor's Cabinet concerning drought conditions on a weekly basis.
- The Governor's Press Office will encourage media outlets within the drought emergency area to publicize updates of drought conditions by developing weekly press releases.
- All public waterworks and self-supplied water users who withdraw more than 10,000 gallons per day will initiate mandatory water conservation requirements contained in drought water conservation and contingency plans that include the mandatory non-essential water use restrictions listed on page 16.
- All public waterworks and self-supplied water users who withdraw more than 10,000 gallons per day that have not developed drought water conservation and contingency plans initiate the mandatory non-essential water use restrictions listed below including the elimination of non-essential flushing of water lines.
- All self-supplied users, who withdraw less than 10,000 gallons per day, including private well users, will initiate the mandatory non-essential water use restrictions listed below.
- All executive branch agencies and institutions will implement drought water conservation and contingency plans with the goal of reducing water usage by 15% that include the mandatory non-essential water use restrictions listed on page 16.
- Local governments and public waterworks may impose water use restrictions more stringent than the mandatory non-essential water use restrictions listed below consistent with local water supply conditions at any time.
- For the duration of the declared drought emergency the Director of the Department of Environmental Quality shall be authorized to allocate ground water and surface water resources and to restrict any withdrawals based upon the adequacy of the resource to meet the necessary beneficial uses as set forth in §62.1-44.36 of the Code of Virginia. Such allocations may apply to any withdrawer and shall over-ride any existing authorizations to use or withdraw surface water or ground water.
- For the duration of the declared drought emergency the State Forester shall be authorized to declare open burning bans in wild fire susceptible areas of the Commonwealth.
- For the duration of the declared drought emergency the Departments of State Police, Transportation and Motor Vehicles shall be authorized to grant temporary overweight/overwidth/registration/license exemptions to carriers transporting essential emergency relief supplies into and through the Commonwealth in order to support the disaster response and recovery.
- Volume I, Virginia Emergency Operations Plan (COVEOP) Basic Plan, July 1997 as amended shall be implemented by agencies of the state and local government along with other appropriate state agency plans.
- The Virginia Emergency Operations Center (VEOC) and State Emergency Response Team (SERT) will be activated to coordinate state operations in support of affected localities and the Commonwealth, to include issuing mission assignments to agencies designated in the COVEOP and others that may be identified by the State Coordinator of Emergency Management, in consultation with the Secretary of Public Safety, which are needed to provide for the preservation of life, protection of property and implementation of recovery activities.

- Local governments of the Commonwealth will be authorized to adopt local ordinances to enforce the mandatory non-essential water use restrictions listed below and to establish, collect, and retain fines for violations of these restrictions. Nothing contained in this drought response plan should be construed to limit the powers of local government to adopt and enforce local emergency ordinances as necessary to protect the public welfare, safety and health.

Mandatory Non-essential Water Use Restrictions

The following non-essential water uses will be prohibited during periods of declared drought emergencies. Please note the exceptions that follow each prohibited use. These prohibitions and exceptions will apply to uses from all sources of water and will only be effective when the Governor of Virginia declares a Drought Emergency through the issuance of an executive order. Water use restrictions shall not apply to the agricultural production of food or fiber, the maintenance of livestock including poultry, nor the commercial production of plant materials so long as best management practices are applied to assure the minimum amount of water is utilized.

Unrestricted irrigation of lawns is prohibited.

- Newly sodded and seeded areas may be irrigated to establish cover on bare ground at the minimum rate necessary for no more than a period of 60 days. . Irrigation rates may not exceed one inch of applied water in any 7 day period.
- Gardens, bedding plants, trees, shrubs and other landscape materials may be watered with hand held containers, hand held hoses equipped with an automatic shutoff device, sprinklers or other automated watering devices at the minimum rate necessary but in no case more frequently than twice per week. Irrigation should not occur during the heat of the day.
- All allowed lawn irrigation must be applied in a manner to assure that no runoff, puddling or excessive watering occurs.
- Irrigation systems may be tested after installation, routine maintenance or repair for no more than ten minutes per zone.

Unrestricted irrigation of golf courses is prohibited.

- Tees and greens may be irrigated between the hours of 9:00 p.m. and 10:00 a.m. at the minimum rate necessary.
- Localized dry areas may be irrigated with a hand held container or hand held hose equipped with an automatic shutoff device at the minimum rate necessary.
- Greens may be cooled by syringing or by the application of water with a hand held hose equipped with an automatic shutoff device at the minimum rate necessary.
- Fairways may be irrigated between the hours of 9:00 p.m. and 10:00 a.m. at the minimum rate necessary not to exceed one inch of applied water in any ten-day period.
- Fairways, tees and greens may be irrigated during necessary overseeding or resodding operations in September and October at the minimum rate necessary. Irrigation rates during this restoration period may not exceed one inch of applied water in any seven-day period.

- Newly constructed fairways, tees and greens and areas that are re-established by sprigging or sodding may be irrigated at the minimum rate necessary not to exceed one inch of applied water in any seven-day period for a total period that does not exceed 60 days.
- Fairways, tees and greens may be irrigated without regard to the restrictions listed above so long as:
 - The only water sources utilized are water features whose primary purpose is stormwater management,
 - Any water features utilized do not impound permanent streams,
 - During declared Drought Emergencies these water features receive no recharge from other water sources such as ground water wells, surface water intakes, or sources of public water supply, and,
 - All irrigation occurs between 9:00 p.m. and 10:00 a.m.
- All allowed golf course irrigation must be applied in a manner to assure that no runoff, puddling or excessive watering occurs.
- Rough areas may not be irrigated.

Unrestricted irrigation of athletic fields is prohibited.

- Athletic fields may be irrigated between the hours of 9:00 p.m. and 10:00 a.m. at a rate not to exceed one inch per application or more than a total of one inch in multiple applications during any ten-day period. All irrigation water must fall on playing surfaces with no outlying areas receiving irrigation water directly from irrigation heads.
- Localized dry areas that show signs of drought stress and wilt (curled leaves, foot-printing, purpling) may be syringed by the application of water for a cumulative time not to exceed fifteen minutes during any twenty four hour period. Syringing may be accomplished with an automated irrigation system or with a hand held hose equipped with an automatic shutoff device at the minimum rate necessary.
- Athletic fields may be irrigated between the hours of 9:00 p.m. and 10:00 a.m. during necessary overseeding, sprigging or resodding operations at the minimum rate necessary for a period that does not exceed 60 days. Irrigation rates during this restoration period may not exceed one inch of applied water in any seven-day period. Syringing is permitted during signs of drought stress and wilt (curled leaves, foot-printing, purpling).
- All allowed athletic field irrigation must be applied in a manner to assure that no runoff, puddling or excessive watering occurs.
- Irrigation is prohibited on athletic fields that are not scheduled for use within the next 120-day period.
- Water may be used for the daily maintenance of pitching mounds, home plate areas and base areas with the use of hand held containers or hand held hoses equipped with an automatic shutoff device at the minimum rate necessary.
- Skinned infield areas may utilize water to control dust and improve playing surface conditions utilizing hand held containers or hand held hoses equipped with an automatic shutoff device at the minimum rate necessary no earlier than two hours prior to official game time.

Washing paved surfaces such as streets, roads, sidewalks, driveways, garages, parking areas, tennis courts, and patios is prohibited.

- Driveways and roadways may be pre-washed in preparation for recoating and sealing.
- Tennis courts composed of clay or similar materials may be wetted by means of a hand-held hose equipped with an automatic shutoff device at the minimum rate necessary for maintenance. Automatic wetting systems may be used between the hours of 9:00 p.m. and 10:00 a.m. at the minimum rate necessary.
- Public eating and drinking areas may be washed using the minimum amount of water required to assure sanitation and public health.
- Water may be used at the minimum rate necessary to maintain effective dust control during the construction of highways and roads.

Use of water for washing or cleaning of mobile equipment including automobiles, trucks, trailers and boats is prohibited.

- Mobile equipment may be washed using hand held containers or hand held hoses equipped with automatic shutoff devices provided that no mobile equipment is washed more than once per calendar month and the minimum amount of water is utilized.
- Construction, emergency or public transportation vehicles may be washed as necessary to preserve the proper functioning and safe operation of the vehicle.
- Mobile equipment may be washed at car washes that utilize reclaimed water as part of the wash process or reduce water consumption by at least 10% when compared to a similar period when water use restrictions were not in effect.
- Automobile dealers may wash cars that are in inventory no more than once per week utilizing hand held containers and hoses equipped with automatic shutoff devices, automated equipment that utilizes reclaimed water as part of the wash process, or automated equipment where water consumption is reduced by at least 10% when compared to a similar period when water use restrictions were not in effect.
- Automobile rental agencies may wash cars no more than once per week utilizing hand held containers and hoses equipped with automatic shutoff devices, automated equipment that utilizes reclaimed water as part of the wash process, or automated equipment where water consumption is reduced by at least 10% when compared to a similar period when water use restrictions were not in effect.
- Marine engines may be flushed with water for a period that does not exceed 5 minutes after each use.

Use of water for the operation of ornamental fountains, artificial waterfalls, misting machines, and reflecting pools is prohibited.

- Fountains and other means of aeration necessary to support aquatic life are permitted.

Use of water to fill and top off outdoor swimming pools is prohibited.

- Newly built or repaired pools may be filled to protect their structural integrity.
- Outdoor pools operated by commercial ventures, community associations, recreation associations, and similar institutions open to the public may be refilled as long as:
 - Levels are maintained at mid-skimmer depth or lower,
 - Any visible leaks are immediately repaired,
 - Backwashing occurs only when necessary to assure proper filter operation,

- Deck areas are washed no more than once per calendar month (except where chemical spills or other health hazards occur),
- All water features (other than slides) that increase losses due to evaporation are eliminated, and
- Slides are turned off when the pool is not in operation.
- Swimming pools operated by health care facilities used in relation to patient care and rehabilitation may be filled or topped off.
- Indoor pools may be filled or topped off.
- Residential swimming pools may be filled only to protect structural integrity, public welfare, safety and health and may not be filled to allow the continued operation of such pools.

Water may be served in restaurants, clubs, or eating-places only at the request of customers.

All residential, business and industrial water users; whether supplied by public water supplies, self-supplied sources, or private water wells; who do not normally utilize water for any of the listed prohibited uses are requested to voluntarily reduce water consumption by at least 10%. This reduction may be the result of elimination of other non-essential water uses, application of water conservation practices, or reduction in essential water uses.

Water Rationing

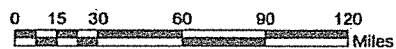
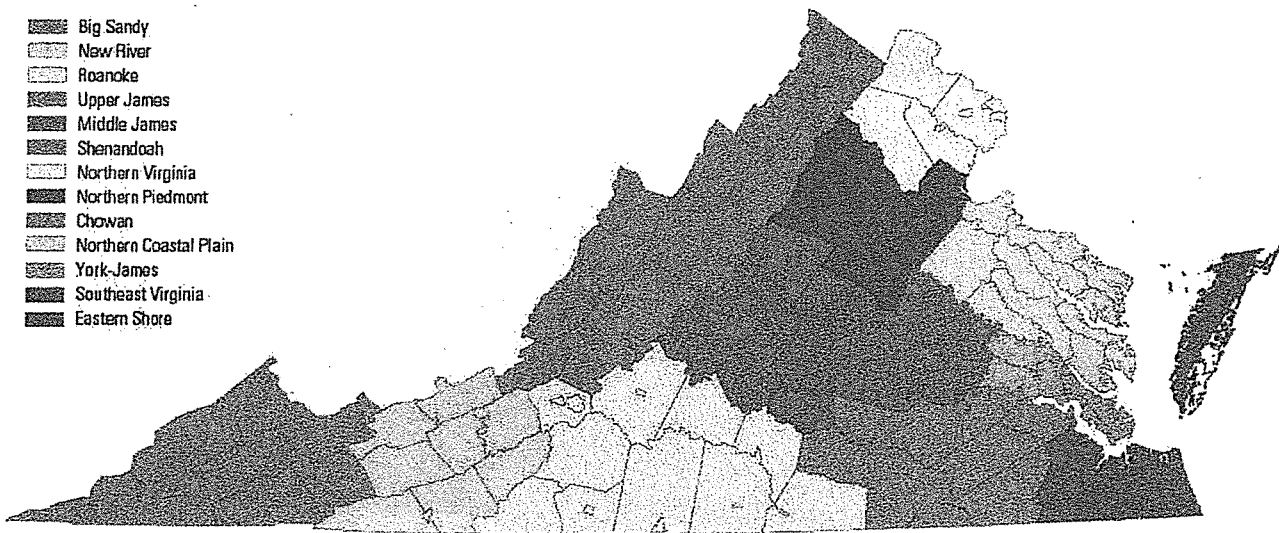
In some cases, the mandatory non-essential water use restrictions may not be sufficient to protect the supplies of an individual public waterworks. When an individual waterworks' sources are so depleted as to threaten public health and safety, it may become necessary to ration water within that system in order to assure that water is available to support essential uses. Rationing water is a more severe measure than merely banning nonessential uses of water. Under rationing, each customer is allotted a given amount of water, based on a method of allotment developed by the waterworks or local government. Generally it will be based on a percentage of previous usage or on a specific daily quantity per household. Rationing is more likely to have some effect on welfare than mandatory non-essential use restrictions, because industrial and commercial water uses may be curtailed or eliminated to assure an adequate supply is available for human consumptive uses.

The decision to ration water will typically be made by the local government or waterworks operator. The Virginia Drought Coordinator will work closely with any entity where water rationing is required to assure that all available State resources are effectively used to support these highly stressed water supply systems. The Virginia Department of Emergency Management (VDEM) is the first point of contact for waterworks or local governments who decide to ration water. VDEM will coordinate the Commonwealth's response and assistance to such entities.

Appendix A

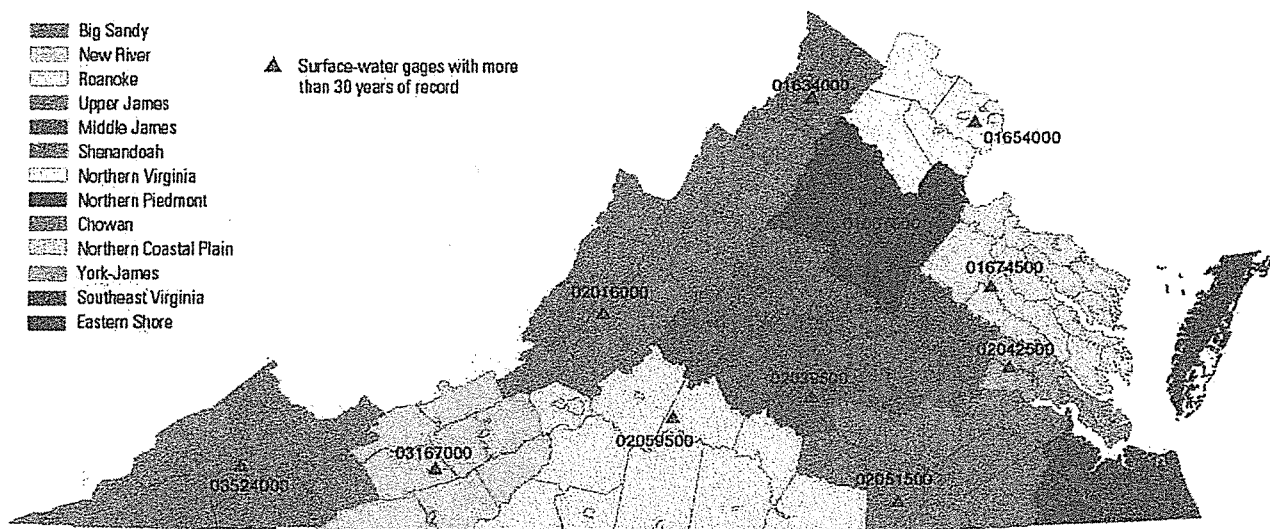
State of Virginia Drought Evaluation Regions

- Big Sandy
- New River
- Roanoke
- Upper James
- Middle James
- Shenandoah
- Northern Virginia
- Northern Piedmont
- Chowan
- Northern Coastal Plain
- York-James
- Southeast Virginia
- Eastern Shore



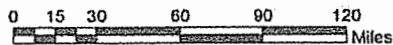
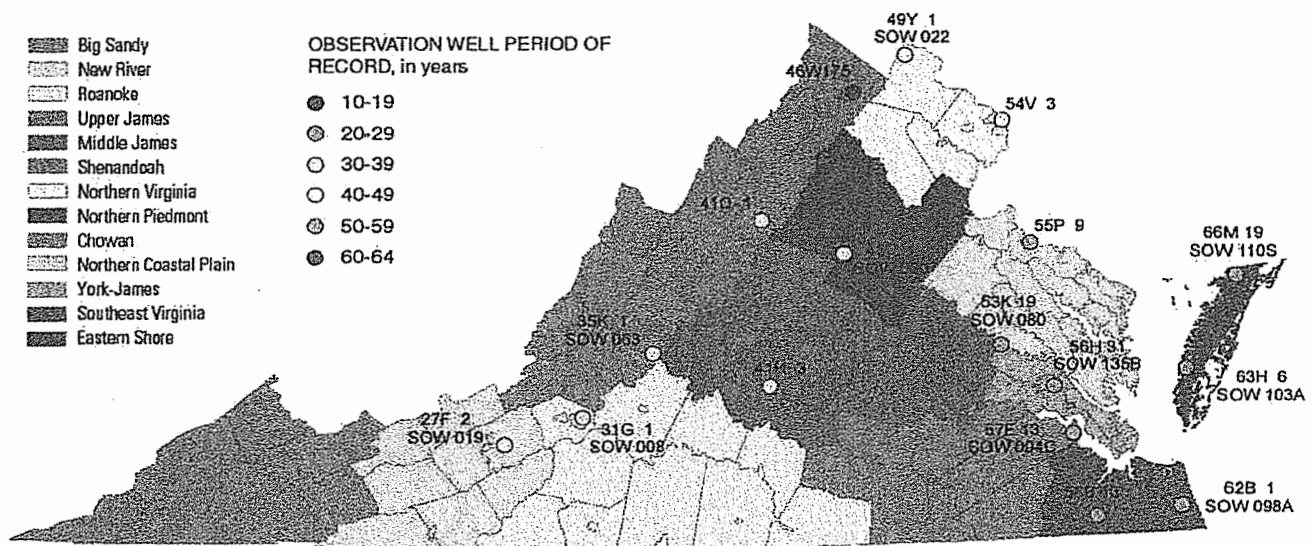
Appendix B

State of Virginia Drought Evaluation Regions Surface-Water Drought Response Network



Appendix C

State of Virginia Drought Evaluation Regions Ground-Water Drought Response Network



ATTACHMENT B

MITIGATION PLAN

MITIGATION PLAN

DEQ Ground Water Withdrawal Permit No. GW0043501

Owner Name Boykins Holdings, LLC

Facility Name AEC Virginia

Location Boykins, Virginia

INTRODUCTION

On September 1, 2013, a permit to withdraw groundwater was issued to Narricot Industries, LLC by the Virginia Department of Environmental Quality (DEQ). On September 23, 2014, a Ground Water Withdrawal Permit - Change of Ownership Agreement Form was submitted to DEQ requesting transfer of the ownership of Ground Water Withdrawal Permit number GW0043501 from Narricot Industries, LLC to Boykins Holdings, LLC. The facility's name also changed to AEC Virginia. Ground water withdrawals associated with this permit will be utilized to manufacture webbing. The ground water is used in the dyeing of the webbing and operation of the boilers used to set the dyes and dry the webbing.

The purpose of this Mitigation Plan is to provide existing ground water users a method to resolve claims that may arise due to the impact of the withdrawal from the well field.

Predicted drawdown of water levels due to the withdrawal from the Middle Potomac aquifer is shown in figure *(DEQ to perform area of impact of the proposed withdrawal evaluation.)*

Modeled impacts, as shown on the attached maps *(DEQ to perform area of impact of the proposed withdrawal evaluation.)*, extend beyond the boundary of the Boykins Holdings, LLC facility. Due to these findings, Boykins Holdings, LLC recognizes that there will be a rebuttable presumption that water level declines that cause adverse impacts to existing ground water users within the area of impact are due to this withdrawal. Claims may be made by ground water users outside this area, however, there is a rebuttable presumption that Boykins Holdings, LLC has not caused the adverse impact. Boykins Holdings, LLC proposes this plan to mitigate impacts to existing users and excludes impacts to wells constructed after the effective date of this permit.

CLAIMANT REQUIREMENTS

To initiate a claim, the claimant must provide written notification of the claim to the following address:

Contact Name	Plant Manager
Permittee Name	Boykins Holdings, LLC
Address	32056 East Circle
City, State Zip Code	Boykins, Virginia 23827

The claim must include the following information: (a) a deed or other available evidence that the claimant is the owner of the well and the well was constructed and operated prior to the effective date of the permit; (b) all available information related to well construction, water levels, historic yield, water quality, and the exact location of the well sufficient to allow to locate the well on the claimant's property; (c) the reasons the claimant believes that the Boykins Holdings, LLC withdrawal has caused an adverse impact on the claimants well(s).

CLAIM RESOLUTION

Boykins Holdings, LLC will review any claim within **five (5) business days**. If Boykins Holdings, LLC determines that no rebuttal will be made and accepts the claim as valid, Boykins Holdings, LLC will so notify the claimant and will implement mitigation within **thirty (30) business days**. If the claim is not accepted as valid, Boykins Holdings, LLC will notify the claimant that (a) the claim is denied or (b) that additional documentation from the claimant is required in order to evaluate the claim. Within **fifteen (15) business days** of receiving additional documentation from the claimant, Boykins Holdings, LLC will notify the claimant (a) that Boykins Holdings, LLC agrees to mitigate adverse impacts or (b) the claim is denied. If the claim is denied, the claimant will be notified that the claimant may request the claim be evaluated by a three (3) member committee. This committee will consist of one (1) representative selected by Boykins Holdings, LLC, one (1) representative selected by the claimant, and one (1) representative mutually agreed upon by the claimant and Boykins Holdings, LLC.

Any claimant requesting that a claim be evaluated by the committee should provide the name and address of their representative to Boykins Holdings, LLC. Within **five (5) business days** of receipt of such notification, Boykins Holdings, LLC will notify the claimant and claimant's representative of the identity of Boykins Holdings, LLC representative and instruct the representatives to select a third representative within **ten (10) business days**. Representatives should be a professional engineer or hydrogeologist with experience in the field of ground water hydrology. Boykins Holdings, LLC agrees to reimburse the members of the committee for reasonable time spent, at a rate prevailing in the area for experts in the above listed fields, and for direct costs incurred in administering the plan. The claimant may, at his or her option, choose to provide the reimbursement for the member of the committee selected by the claimant and up to half of the reimbursement for the mutual representative.

Within **ten (10) business days** of selection of the third representative, the committee will establish a **reasonable deadline** for submission of all documentation it needs to evaluate the claim. Both the claimant and Boykins Holdings, LLC will abide by this deadline.

Within **fifteen (15) business days** of receipt of documentation, the committee will evaluate the claim and reach a decision by majority vote. The committee will notify the claimant regarding its decision to (a) deny or (b) approve the claim. If the claim is approved, Boykins Holdings, LLC will mitigate the adverse impacts within **thirty (30) business days** of making the decision or as soon as practical. If the claim is denied by the committee, Boykins Holdings, LLC may seek reimbursement from the claimant for the claimant's committee representative and one half of the 3rd representative on the committee.

If a claimant within the indicated area of impact indicates that they are out of water, Boykins Holdings, LLC will accept the responsibility of providing water for human consumptive needs within **seventy-two (72) hours** and to cover the claim review period. Boykins Holdings, LLC reserves the right to recover the cost of such emergency supply if the claim is denied by Boykins Holdings, LLC or found to be fraudulent or frivolous. If Boykins Holdings, LLC denies a claim and the claimant elects to proceed with the three (3) member committee, Boykins Holdings, LLC will continue the emergency water supply at the claimants request during the committee's deliberations, but reserves the right to recover the total costs of emergency water supply in the case that the committee upholds the denial of the claim. Similarly, Boykins Holdings, LLC reserves the right to recover costs associated with the claim process if a claim is found to be fraudulent or frivolous.

If it is determined by the committee or shown to the committee's satisfaction that a well operating under a mitigation plan similar to Boykins Holdings, LLC Plan other than those owned and operated by Boykins Holdings, LLC has contributed to the claimed adverse impact, Boykins Holdings, LLC share of the costs associated with mitigation will be allocated in proportion to its share of the impact. Such a determination shall be made by the committee after notification of the third party well owner, giving the third party well owner opportunity to participate in the proceedings of the committee.

PLAN ADMINISTRATION

Nothing in the Plan shall be construed to prevent the Department of Environmental Quality Staff from providing information needed for resolution of claims by the committee.